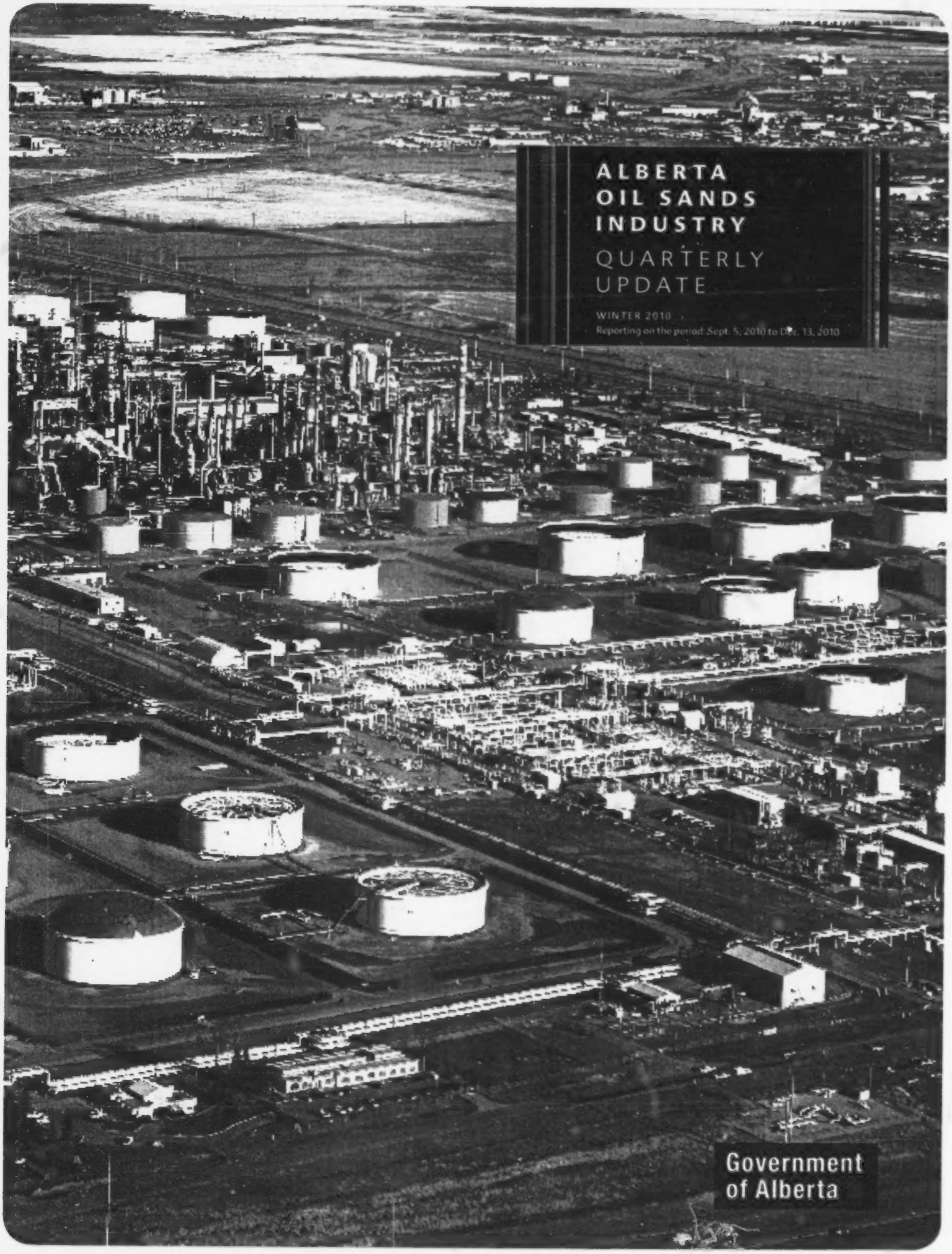
ALBERTA
OIL SANDS
INDUSTRY
QUARTERLY
UPDATE
WINTER 2010
Reporting on the period Sept. 5, 2010 to Dec. 13, 2010
Government
of Alberta

All about the oil sands

Background of an important global resource

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All photos © 2010, JuneWarren-Nickle's Energy Group

Alberta has the second-largest deposit of oil in the world — only Saudi Arabia can claim a larger stockpile of crude. But 170 billion of Alberta's 179 billion barrels of oil have the special quality of being bitumen, a resource that has been developed for decades but is only now coming into the forefront of the global energy industry, as conventional supplies — so-called "easy" oil — continue to be depleted. The figure of 170 billion barrels represents what is considered economically recoverable with today's technology, but with new technologies, this reserve estimate could be increased to as much as 315 billion barrels.

There are three major bitumen (or oil sands) deposits in Alberta. The largest is the Athabasca deposit, located in the province's northeast in the Regional Municipality of Wood Buffalo. The main population centre of the Athabasca deposit is the City of Fort McMurray. The second-largest oil sands deposit is referred to as Cold Lake, just south of Athabasca, with the main population centre the City of Cold Lake. The smallest oil sands deposit is known as Peace River, which is located in northwest central Alberta. A fourth deposit called Wabasca links to the Athabasca and is generally lumped in with that area.

The existence of bitumen in Alberta has been known for a long time. The first mention of it in Canadian history was in 1719, when a Cree named Wapasu brought a sample of the "gum" to a Hudson's Bay trading post. First Nations in what is now the Wood Buffalo area had traditionally used the bitumen, which seeps from outcrops along the Athabasca River, to waterproof their canoes.

Today bitumen is produced as an energy source by two means — mining and in situ. The majority of oil sands production is done by surface mining, but this will likely change in the future, as 80 per cent of Alberta's bitumen deposits are too deep underground to economically employ this technology.

Right now there are essentially two commercial methods of in situ (Latin for "in place," essentially meaning wells are used rather than trucks and shovels). In cyclic steam stimulation (CSS), high-pressure steam is injected into directional wells drilled from pads for a period of time, then the steam is left to soak in the reservoir for a period, melting the bitumen, and then the same wells are switched into production mode, bringing the bitumen to the surface.

In steam assisted gravity drainage (SAGD), parallel horizontal well pairs are drilled from well pads at the surface. One is drilled near the top of the target reservoir, while the other is drilled near its bottom. Steam is injected into the top well, a steam chamber forms, and via gravity, the melted bitumen flows into the lower well and is pumped to the surface using artificial lift.

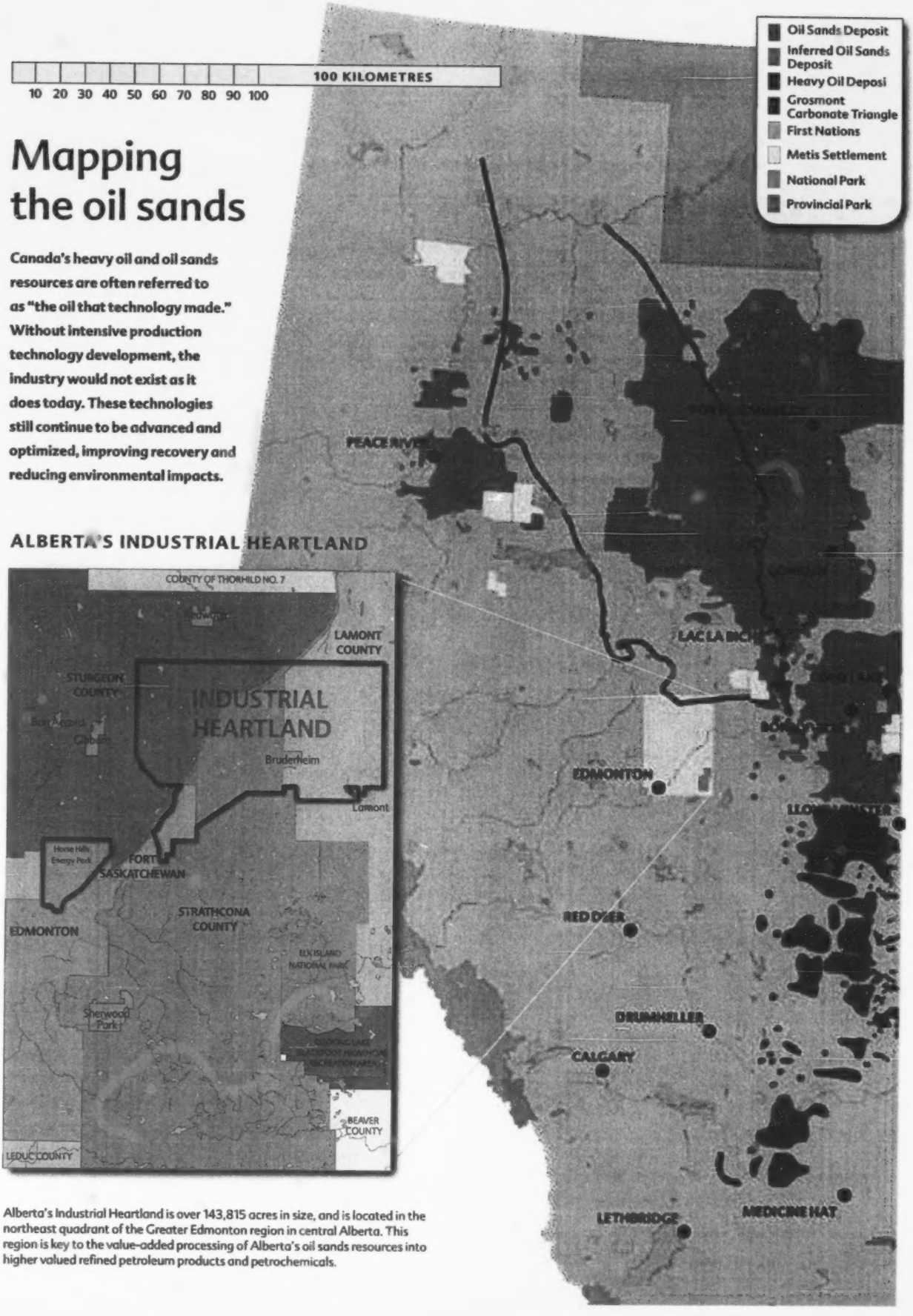
Both SAGD and CSS are used in the Cold Lake and Peace River deposits, while SAGD is the in situ technology of choice in the Athabasca deposit. The choice is based on a number of things including geology. The technologies combined currently produce just over one million barrels per day.

Research is underway on a number of other production technologies designed to optimize production and minimize water and energy use, including vapour extraction (VAPEX), and a form of in situ combustion known as toe to heel air injection (THAI).

Bitumen that has not been processed, or "upgraded," can be used directly as asphalt. It must be diluted to travel by pipeline. Adding value, some producers upgrade their product into synthetic crude oil (SCO), which is a refinery feedstock. At these refineries it can be transformed into transportation fuels and other products. ■

Mapping the oil sands

Canada's heavy oil and oil sands resources are often referred to as "the oil that technology made." Without intensive production technology development, the industry would not exist as it does today. These technologies still continue to be advanced and optimized, improving recovery and reducing environmental impacts.



Alberta's Industrial Heartland is over 143,815 acres in size, and is located in the northeast quadrant of the Greater Edmonton region in central Alberta. This region is key to the value-added processing of Alberta's oil sands resources into higher valued refined petroleum products and petrochemicals.

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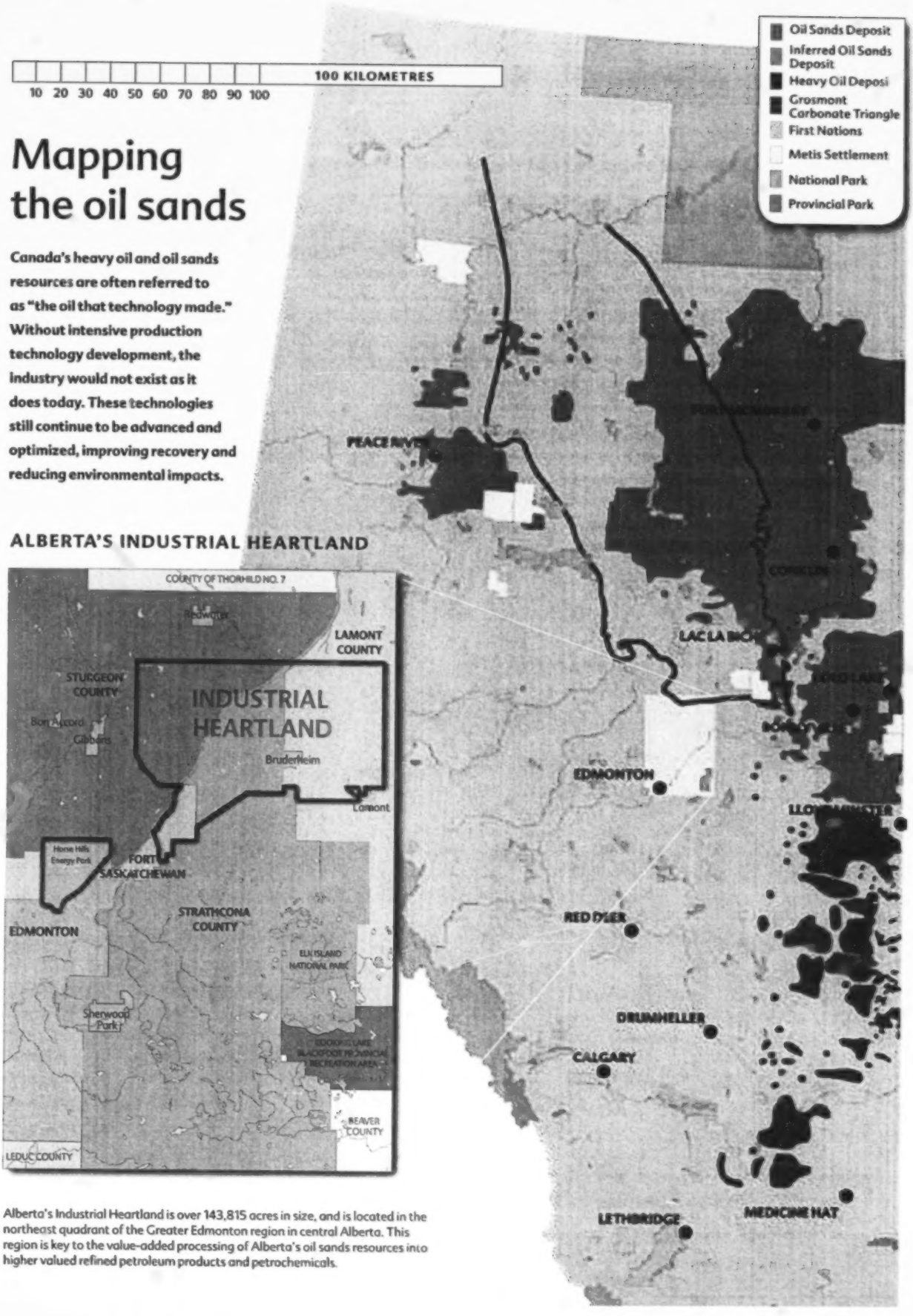

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Government update

REPORT MEASURES ALBERTA'S ABILITY TO COMPETE GLOBALLY

On Dec. 10, 2010, Alberta's Competitiveness Council released a new benchmarking report that showed the province has a competitive edge over its closest competitors, but also identifies areas for improvement to ensure Alberta remains an attractive investment location.

Report on Competitiveness: Alberta 2010 provides quantifiable evidence of the province's ability to compete in a world market by looking at a variety of factors crucial to success, including productivity, innovation, taxes and fiscal policy, regulation, transportation and infrastructure, labour force development and access to capital markets.

Overall, the report indicates that Alberta is performing well in comparison to 14 other provincial and international jurisdictions. Alberta ranks first or second in 24 of the 60 measures. Altogether, Alberta rates either above-average or average in 45 measures.

Areas of provincial strength include living standards, economic well-being, labour productivity, investment in machinery and equipment, and taxes and fiscal policy. According to the report, Alberta has room for improvement in productivity growth, innovation investments, non-resource exports, high-tech employment and venture capital investment.

This report provides solid information to guide the council in its work, including the development of recommendations for action expected this summer. It also provides government with the ability to better track trends and changes in Alberta's competitiveness over time.

A copy of the report is available at www.finance.alberta.ca/competitiveness.

WESTERN PROVINCES UNITE TO IMPROVE ACCESS TO ASIAN MARKETS

Energy ministers from Alberta, British Columbia and Saskatchewan signed an agreement in December 2010 that will help expand and strengthen Canada's position as an energy powerhouse. Arising from the New West Partnership created during the spring, the Energy Memorandum of Understanding will combine and build on the existing strengths of all three provinces to expand the region's energy sectors — attracting new investment, stimulating job creation and strengthening the region's economy. The three provinces will begin working immediately on a number of projects, including developing a joint strategy to target opportunities in Asia and improving consultation with industry.

AMENDMENTS GUIDE USE OF CCS TECHNOLOGY

In November 2010, through the Carbon Capture and Storage Statutes Amendment Act, the Alberta government introduced legislation that will guide how large-scale carbon capture and storage CCS projects will proceed in Alberta. It clarifies ownership of pore space, which are tiny holes in porous rock where carbon would be stored deep underground.

Under the proposed legislation, the Alberta government would accept long-term liability for injected CO_2 once the operator provides data showing that the stored CO_2 is contained. It would also establish a fund financed by CCS operators for ongoing monitoring costs and any required remediation. The legislation does not propose any changes to ownership of mine and minerals resources. This law makes Alberta the first province in Canada to introduce comprehensive legislation for this greenhouse gas reduction technology.

CCS MAJOR INITIATIVES

The Government of Alberta has signed letters of intent with the following four project proponents to implement large-scale CCS projects in Alberta:

- Enhance Energy Inc. and Northwest Upgrading: The Alberta Carbon Trunk Line, Alberta's first CO_2 pipeline distribution system, will be capable of gathering CO_2 from sources in Alberta's Industrial Heartland and transporting it to existing mature oilfields to be used for enhanced oil recovery.
- Shell: The Quest project will capture and store 1.2 million tonnes of CO_2 annually beginning in 2015 from Shell's Scotford upgrader.
- Swan Hills Synfuels: The in situ coal gasification project will access deep coal seams in order to convert the coal into a clean synthetic gas known as syngas.
- TransAlta Corporation and partners: Project Pioneer will use leading-edge technology to capture CO_2 for enhanced oil recovery in nearby conventional oilfields.

Funding for these initiatives, which will reduce greenhouse gas emissions by five million tonnes annually beginning in 2015, will come from the $2-billion CCS fund announced in 2008.

Updates on Alberta's CCS initiative are available at www.energy.gov.ab.ca/Initiatives/1438.asp.

MINISTER LIEPERT PROMOTES RESPONSIBLE DEVELOPMENT AT U.S. ENERGY COUNCIL MEETING

Energy Minister Ron Liepert discussed Alberta's commitment to responsible energy development with government and industry representatives from across North America at the U.S. Energy Council

meeting held in Santa Fe, New Mexico, from Dec. 9–12. Discussions at the Energy Council's 2010 Global Energy and Environmental Issues Conference covered a range of issues pertaining to shale gas development, energy security, and renewable and clean energy technology.

As a centre of excellence for CCS, Minister Liepert took this opportunity to outline Alberta's leading-edge work on large-scale CCS and share Alberta's experience with other participating jurisdictions.

The Energy Council is a legislative organization of 12 energy-producing U.S. states, along with international affiliates Alberta, British Columbia, Newfoundland and Labrador, Nova Scotia, Saskatchewan and Venezuela.

MINISTER RENNER ATTENDS CLIMATE CHANGE CONFERENCE

Environment Minister Rob Renner travelled to Cancun, Mexico, to represent Alberta's interests and priorities for a global greenhouse gas reduction framework at the United Nation's 16th annual climate change conference held from Nov. 29 to Dec. 10.

During his time at the conference, Minister Renner also met with other participating jurisdictions to discuss Alberta's $2-billion investment in CCS, the province's experience operating North America's only emissions reduction program and Alberta's clean energy technology fund, which has already collected $187 million.

ERCB CONDITIONAL APPROVAL OF FINAL TWO TAILINGS PLANS

In December 2010, the Energy Resources Conservation Board (ERCB) conditionally approved the final two tailings plans submitted under Directive 074: Tailings Performance Criteria and Requirements for Oil Sands Mining Schemes.

The Canadian Natural Resources Horizon and Shell Jackpine plans represent the seventh and eighth tailings plans submitted to the ERCB by five oil sands operators in total. To date, the ERCB has conditionally approved tailings management plans for the Suncor Millennium/Steepbank, Suncor Fort Hills, Syncrude Mildred Lake and Aurora, Imperial Kearl and Shell Muskeg River projects.

Collectively, the five oil sands operators have committed more than $4 billion in technology, infrastructure and upgrades to meet the regulatory requirements in Directive 074. Over the life of the projects, tailings reduction at those sites will exceed Directive 074 requirements.

The tailings plan approvals end an important initial phase in the implementation of Directive 074. By Sept. 30, 2011, operators must submit annual tailings plan updates to ensure that tailings ponds are being managed in accordance with their tailings plans and that upgrades are being made on schedule.

ERCB STREAMLINES IN SITU OIL SANDS APPLICATION PROCESS

In December 2010, as part of its commitment to streamlining and improving its regulatory requirements, the ERCB issued Directive 078: Regulatory Application Process for Modifications to Commercial In Situ Oil Sands Projects. The new ERCB directive redesigns the regulatory approach to amendment applications for all commercial in situ oil sands projects.

Commercial in situ oil sands projects typically take years to construct, and they operate for several decades. As technology changes and operational experience grows, the ERCB will receive multiple amendment applications from each in situ project. The new directive will streamline the amendment application process by employing one of three regulatory categories, depending on the nature and complexity of the amendment. For additional details, go to www.ercb.ca.

The changes to the ERCB's in situ oil sands application process complement the Government of Alberta's *Energizing Investment: A Framework to Improve Alberta's Natural Gas and Conventional Oil Competitiveness* released in March 2010. The framework aims to ensure that Alberta provides a leading competitive environment for oil and gas investment in Alberta.

ALBERTA KICK-STARTS NEW WORLD-CLASS MONITORING SYSTEM

In working to ensure that Alberta continues to be leader in responsible oil sands development, the Government of Alberta has taken steps to solicit independent expert advice on how to best set up, operate and govern a world-class environmental monitoring, evaluation and reporting system for Alberta's oil sands. A transparent monitoring system is critical as Alberta continues the transition to a cumulative effects system of environmental management.

The expert group will also give direction for provincial action required to address and implement recommendations that arise from the provincial data review undertaken in 2010, as well as those from the federal oil sands advisory panel. The independent experts are to be in place by January 2011 and will report back to the minister of environment by June 2011. As the first area in Alberta to move towards this new system, the oil sands region will serve as a pilot for the rest of the province. ■

What's new in the oil sands

Key updates from winter 2010

Husky Energy is officially going ahead with the 60,000-barrel-per-day first phase of the Sunrise steam assisted gravity drainage (SAGD) project, allocating it $415 million in 2011 spending. However, the money will come from Husky's partner, BP, which has committed to funding the first $2.5 billion of the project. Contracts for transportation, engineering and construction, valued at approximately $2 billion, will soon be awarded.

"Sunrise represents a transformational opportunity for the company," says Asim Ghosh, Husky's president and chief executive officer. "Over time, Sunrise alone has the potential to deliver more than 50 per cent of our current production and is just one of several oil sands leases in Husky's portfolio. Collectively, they will provide a source of stable growth to create substantial shareholder value in the coming decades."

With the acquisition in early October of additional leases adjacent to its recently approved Kirby SAGD project, Canadian Natural Resources Limited is planning to increase the ultimate size of the installation. The overall target will be between 70,000 and 100,000 barrels per day, including the second and debottlenecking phase, says Canadian Natural Resources president Steve Laut. The company's board of directors has sanctioned Kirby Phase 1 at an estimated cost of $1.5 billion, roughly $31,250 per barrel per day of capacity, which will be 40,000 barrels per day. First steam is targeted for 2013. In October, Canadian Natural purchased new assets at Kirby from Enerplus Resources Fund, adding 520 million barrels of recoverable oil at a cost of $405 million.

Bangkok, Thailand–based PTT Exploration and Production Public Company Limited has entered into a deal where it will buy a 40 per cent stake in Statoil's Kai Kos Dehseh oil sands assets for $2.3 billion. Statoil will remain as operator.

The 10,000-barrel-per-day first phase of Kai Kos Dehseh, Leismer, achieved first steam injection in September 2010. Production is expected to commence during first quarter of 2011. Statoil has filed applications for 230,000 additional barrels per day of production under the Kai Kos Dehseh project umbrella.

As Imperial Oil continues construction on the first phase of its Kearl oil sands mining project, the company is reconfiguring the development plan to minimize facility requirements and potentially reduce the plant's footprint.

The initial plan was to develop the $8-billion project in three phases with ultimate production of about 330,000 barrels per day by about 2020, says Imperial spokesman Pius Rolheiser. While plans still call for the initial phase of 110,000 barrels per day to be on production at the end of 2012, Imperial is looking at a combination of debottlenecking the initial facilities, then expansion, then potentially another debottlenecking to achieve the total resource development in about the same time period. Production, in fact, may be slightly higher at about 345,000 barrels per day near 2020, says Rolheiser.

Flint Energy Services has been awarded a contract to fabricate production modules for Suncor Energy's Firebag SAGD project.

Work on the fixed-price contract valued at $18.5 million starts immediately, and work will continue through to the second quarter of 2011, employing up to 200 workers at Flint's fabrication facilities in Sherwood Park, Alberta.

Flint also reports that its subsidiary company, Flint Transfield Services, has negotiated an extension to its Suncor maintenance agreement, which will run until 2016.

The maintenance agreement, which has been in place since 2007, is a five-year rolling, performance-based relationship that delivers base maintenance services to Suncor's upgrading operations in Fort McMurray, Alberta, the Firebag SAGD operations north of Fort McMurray and the Sarnia refinery in Ontario.

The maintenance agreement covers asset management services and other service agreements, which have a potential value in excess of $2.2 billion over the five-year period.

TransCanada Corporation now expects to receive a U.S. presidential permit in the first half of next year for its proposed Keystone Gulf Coast expansion from Alberta to Port Arthur, Texas.

The company expects the final environmental impact statement from the Environmental Protection Agency by the end of this year or early next year, followed by the presidential permit, says Russ Girling, TransCanada president and chief executive officer.

A mid-2011 approval would still enable the southern portion of the 500,000-barrel-per-day line from Cushing, Oklahoma, to Port Arthur, Texas, to be in service by the first quarter of 2013 as requested by shippers who have contracted for 380,000 barrels per day (75 per cent) of capacity, says Alex Pourbaix, president, energy and oil pipelines.

Harvest Operations is ramping up work on its BlackGold thermal bitumen project and will spend between $450 million and $500 million on the project by the end of 2012.

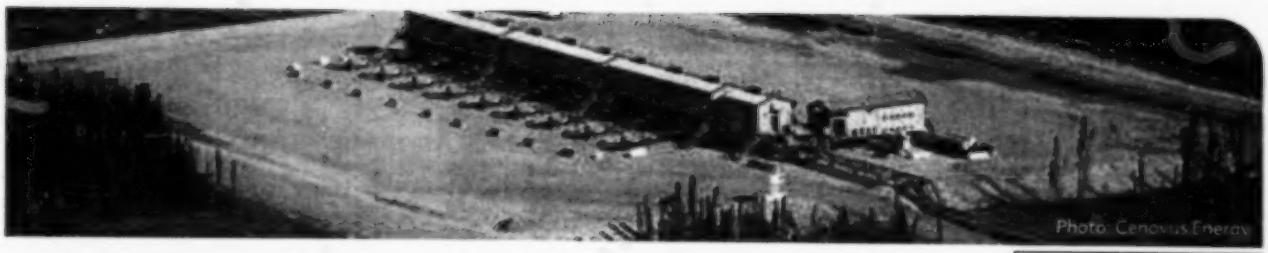


Photo: Cenovus Energy

Harvest, a wholly owned subsidiary of Korea National Oil Corporation, has increased its 2010 capital budget by $70 million to help fund the start of what it says will be an active winter drilling season. The budget increase brings the integrated mid-size producer's projected 2010 spending to about $490 million, up from $233 million in 2009.

■■■ Ivanhoe Energy announced it has completed a major milestone towards commercial production at its Tamarack project with the submission of its regulatory application to the Government of Alberta.

The application is for development of an integrated in situ project to be built in two phases, each at 20,000 barrels per day.

"Filing this application marks the culmination of over three years of detailed environmental, engineering and geological work as well as extensive socio-economic analysis," says David Dyck, Ivanhoe's president and chief operating officer. "Our team has worked diligently to prepare and complete this application, and its submission to the regulatory authorities is the next critical step in our development schedule, which targets first oil in 2013."

■■■ Nitrate-reducing bacteria that promote sedimentation could shrink oil sands tailings ponds and reduce the production and release of the greenhouse gas methane, thereby allowing companies to recycle more water from the ponds, say University of Calgary researchers.

So far, experimenting has been limited to test tubes. The next step is to further test the idea on a scale about 100 times larger than what's been done so far, again in test tubes. It will probably be 5–10 years before it's used in the field, says Dr. Sylvain Bordenave, research lead and a post-doctoral fellow in the Faculty of Science.

Bordenave and other scientists at the Schulich School of Engineering and the Faculty of Science at the university have been working on this for two years.

■■■ Connacher Oil and Gas has announced that combined bitumen production levels from its Pod One and Algar SAGD operations exceeded 12,000 barrels per day during September. Production recently averaged 11,691 barrels per day for the seven days ended Oct. 2.

Algar and Pod One are located on the company's Great Divide oil sands lease block, approximately 80 kilometres southeast of Fort McMurray. Pod One began operations in 2007, while Algar was fired up in 2010. Combined capacity is 10,000 barrels per day.

Connacher says the Algar production ramp-up is ahead of the initial Pod One ramp-up, and it is also running ahead of other record ramp-up rates that have recently been reported for new SAGD operations.

Connacher continues to anticipate achieving a total exit bitumen production rate for 2010 of between 15,500 and 16,500 barrels per day.

■■■ Now that the focus is off the proposed Fort Hills mine, people get to see Frontier and Equinox, the primary assets of newly formed SilverBirch Energy, as legitimate mining projects, says the company's head.

"Nobody used to ask us about our other leases," says Howard Lutley, president and chief executive officer, formerly UTS Energy Corporation's vice-president of mining and extraction.

Launched in early October, SilverBirch was formed as a result of a plan of arrangement between UTS and Total E&P Canada, which purchased UTS's 20 per cent share of the Fort Hills project, operated by Suncor Energy with a 60 per cent interest. The project's remaining 20 per cent is held by Teck Resources.

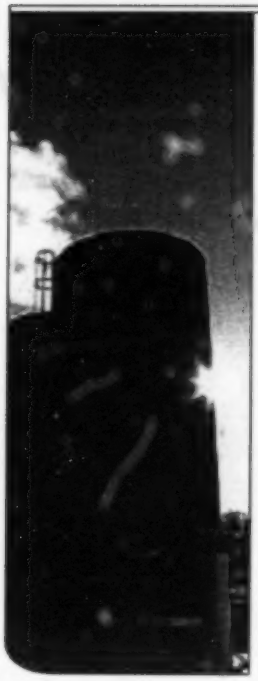
SilverBirch was formed with UTS's remaining assets, as well as its exploration and financial teams. It was "seeded" with $50 million, enough for 18 months of planned operations, says Lutley.

The company's focus for the next year and a half will be on Frontier, with the smaller Equinox as a satellite, and leases 418/271 further east, he said. In the next 18 months, SilverBirch plans to spend $19 million on exploration and $11 million on Frontier and Equinox, with another $6 million–$7 million on general and administrative expenses. It plans to drill 40–50 wells starting in February 2011, as soon as the weather allows it to get on the leases.

■■■ Titanium Corporation and Sustainable Development Technology Canada have announced the completion of the first phase of Titanium's oil sands tailings pilot demonstration project.

"Now that engineering, construction and installation of the major process modules have been completed, we have commenced operations of the pilot," says Scott Nelson, Titanium's president and chief executive officer. "Froth treatment tailings from three oil sands operating sites are being processed over the next four months. We anticipate continuing strong performance of our technology during the program."

Titanium's "Creating Value from Waste" technology has been designed to recover valuable products from waste tailings and reduce environmental impacts in the oil sands industry. A consortium of oil sands operators ➤



is providing tailings to the pilot, which will operate into early 2011.

■ Enbridge will undertake an expansion of its Athabasca Pipeline to accommodate recent shipping commitments by the Christina Lake SAGD project operated by Cenovus Energy. The estimated cost of the project is approximately $185 million. The Athabasca Pipeline transports crude oil from various oil sands projects to the mainline hub at Hardisty, Alberta. As a result of this expansion, which is expected to be in service in 2013, the capacity of the Athabasca Pipeline will be 430,000 barrels per day, depending on crude slate.

Enbridge has also entered into an agreement to provide pipeline and terminalling services to the proposed Husky Energy operated Sunrise SAGD project. Enbridge will construct a new originating terminal (Hartley terminal) at the Sunrise project, a 112-kilometre, 24-inch-diameter pipeline from Hartley to Enbridge's Cheecham terminal and additional tankage at Cheecham.

The estimated cost of the project is about $475 million with an initial capacity of 90,000 barrels per day, expandable to 270,000 barrels per day. The facilities are expected to be in service in the latter half of 2013.

■ Heavy oil know-how is expected to flow in and out of Calgary with the establishment of the GE Global Heavy Oil Centre of Excellence.

The Alberta government and General Electric Canada have signed an agreement that will see the global innovation giant establish two new technology centres in Calgary and collaborate with the province in areas of shared expertise.

The heavy oil centre will provide and leverage engineering resources to develop solutions to the challenges of producing and upgrading heavy oil. It will be located within the GE Innovation Centre, which will showcase GE's innovation and technology capabilities and enable collaboration on solutions to the energy, water and infrastructure challenges facing Alberta and the world.

■ Connacher Oil and Gas says the 13.1-megawatt cogeneration facility at its newly commissioned Algar SAGD plant in the Great Divide region of northeastern Alberta has been completed on time and on budget.

The plant, which is capable of generating 3,700 barrels per day of steam at full design rate, was commissioned in late August and was integrated with the Algar plant in early September following a short plant outage to facilitate the electrical work. Algar is now islanded from the regional electrical grid.

■ Athabasca Oil Sands Corporation (AOSC) and Excelsior Energy have announced that they have entered into an agreement whereby AOSC will acquire all of the issued and outstanding common shares of Excelsior by way of plan of arrangement valued at approximately $144 million.

"The addition of Excelsior's high-quality assets to those of AOSC at Hangingstone is in line with the strategy we have presented to our investors and creates a world-class, standalone project," says Sveinung Svarte, president and chief executive officer of AOSC. "The transaction will result in a project of critical size and an accelerated development of the area. It also gives us ownership of their proprietary COGD [combustion overhead gravity drainage] technology."

■ Royal Dutch Shell, as operator of the Athabasca Oil Sands Project (AOSP), has announced the successful start of production of its 100,000-barrel-per-day Jackpine expansion.

The new Jackpine mine will combine with existing production from the Muskeg River mine to feed the Scotford upgrader, where an expansion is currently underway and scheduled to come on stream in 2011. The AOSP expansion is one of a sequence of major projects that the company says should raise Shell's global oil and gas production by 11 per cent.

■ The Regional Municipality of Wood Buffalo and Total E&P Canada have reached a memorandum of understanding regarding shared commitments to mitigate the socio-economic impacts should Total's Joslyn mining project be approved.

Under the memorandum, which the two groups hope will be adopted as part of the approval, the municipality says it is prepared to support the project, which it had previously committed to stand against during regulatory hearings.

■ Devon Energy's board of directors has sanctioned the company's third SAGD project on its Jackfish leases in the Athabasca oil sands.

Pending approval of the regulatory application filed last month, Devon expects to begin facilities construction at Jackfish 3 near the end of next year with plant start-up targeted for 2015.

Once fully operational, Jackfish 3 is expected to produce an average of 35,000 barrels of oil per day before royalties. Similar to Jackfish 1 and 2, the third phase represents an estimated 300 million barrels of recoverable oil before royalties.

Devon expects to spend US$1.2 billion on the project through start-up.

■ Cenovus Energy has received the regulatory go-ahead to build Phases F, G and H of its Foster Creek SAGD project, expected to boost gross production to 210,000 barrels per day from the current 120,000 barrels per day.

Engineering on Phase F is already underway and preliminary groundwork is expected to start soon. First production from this phase is anticipated in 2014. Production from the other two phases is anticipated in 2016–17. ■

Project listings

Updated status of oil sands projects in Alberta

As of December 10, 2010.

TECHNOLOGY LEGEND

COGD	Combustion overhead gravity drainage
CSS	Cyclic steam stimulation
ET-DSP	Electro-thermal dynamic stripping process
N-SOLV	Heated solvent vapour extraction
SAGD	Steam assisted gravity drainage
THAI	Toe to heel air injection

COMPANY	CURRENT PROJECT	CAPACITY (bbl/d)	[illegible]	REGULATORY STATUS	DEVELOPMENT PROGRESS	TECHNOLOGY
ATHABASCA REGION — IN SITU						
ALBERTA OILSANDS						
Clearwater West	Pilot	4,500	2011	Application	Alberta Oilsands has appointed Andrew Constantinidis as vice-president of finance and business development. Most recently he was president and CFO of Eurogas. The company says his experience in large-project financing will help it accelerate development plans.	SAGD
	Commercial Project	15,000	2012	Announced		SAGD
ATHABASCA OIL SANDS						
MacKay	Phase 1	35,000	2014	Application	AOSC has completed its acquisition of Excelsior Energy. As of late October, the company said it would submit its Dover application by year-end 2010.	SAGD
	Phase 2	40,000	2017	Application		SAGD
	Phase 3	40,000	2019	Application		SAGD
	Phase 4	35,000	2012	Application		SAGD
Dover	Phase 1	35,000–50,000	2015	Announced		SAGD
Hangingstone	Pilot	1,000	2011	Application		COGD
BLACKPEARL RESOURCES						
Blackrod	Pilot	500	2011	Approved	Regulatory approvals received Oct. 2010. BlackPearl plans on drilling the SAGD well pair before the end of 2010, as well as commencing construction of oil handling facilities and installation of steam-generation equipment. First steam is expected in Q1/2011, with results to follow late in the year.	SAGD
CANADIAN NATURAL RESOURCES						
Birch Mountain Phase 1	Phase 1	60,000	2018	Announced		TBA
Birch Mountain Phase 2	Phase 2	60,000	2021	Announced		TBA
Gregoire Lake 1	Phase 1	60,000	2023	Announced		TBA
Grouse	Phase 1	60,000	2016	Announced		SAGD
Kirby	Phase 1	45,000	2013	Under Construction	During Q3/2010, Canadian Natural received approvals for Kirby and sanctioned it.	SAGD
Kirby (legacy Enerplus)	Phase 1	10,000	TBD	Application	Enerplus has sold its Kirby assets to Canadian Natural for $405 million.	SAGD
CENOVUS ENERGY						
Telephone Lake	Phase A	35,000	TBD	Application	Additional information is being collected to support regulatory application.	SAGD
	Phase B	15,000	TBD	Announced		SAGD
Christina Lake	Phase A & B	18,000	2002	Operating	Approvals for E, F and G are expected in 2011, and a wedge-well pilot has been launched at Christina Lake. Application for Phase H to be filed in 2015.	SAGD
	Phase C	40,000	2011	Construction		SAGD
	Phase D	40,000	2013	Approved		SAGD
	Phase E	40,000	2014	Application		SAGD
	Phase F	40,000	2016	Application		SAGD
	Phase G	40,000	2017	Application		SAGD
	Phase H	40,000	2019	Announced		SAGD
Narrows Lake	Phase A–C	130,000	2016	Announced	Application to be submitted in Q3.	SAGD
Foster Creek	Phase A–E	120,000	2001	Application	Cenovus has received regulatory approval to proceed with Foster Creek phases F-H. Engineering on Phase F is already underway, with preliminary ground work expected to commence in the near term.	SAGD
	Phase F	30,000	2014	Approved		SAGD
	Phase G	30,000	2016	Approved		SAGD
	Phase H	30,000	2017	Approved		SAGD
	Phase I	25,000	2019	Announced		SAGD
Grand Rapids	Phase A	60,000	2017	Announced	Single well pair SAGD pilot drilling complete, awaiting Alberta Environment's final approval.	SAGD
	Phase B	60,000	TBD	Announced		SAGD
	Phase C	60,000	TBD	Announced		SAGD
CONNACHER OIL AND GAS						
Great Divide	Pod 1	10,000	2007	Operating	15 out of 17 Algar well pairs are now on full SAGD. Connacher says that since completing construction of its cogen at Great Divide, those operations are more reliable. It has also submitted application for a SAGD/solvent injection test at Algar.	SAGD
	Pod 2 (Algar)	10,000	2010	Operating		SAGD
	Expansion	24,000	2013	Disclosed		SAGD

is providing tailings to the pilot, which will operate into early 2011.

■■■ Enbridge will undertake an expansion of its Athabasca Pipeline to accommodate recent shipping commitments by the Christina Lake SAGD project operated by Cenovus Energy. The estimated cost of the project is approximately $185 million. The Athabasca Pipeline transports crude oil from various oil sands projects to the mainline hub at Hardisty, Alberta. As a result of this expansion, which is expected to be in service in 2013, the capacity of the Athabasca Pipeline will be 430,000 barrels per day, depending on crude slate.

Enbridge has also entered into an agreement to provide pipeline and terminalling services to the proposed Husky Energy operated Sunrise SAGD project. Enbridge will construct a new originating terminal (Hartley terminal) at the Sunrise project, a 112-kilometre, 24-inch-diameter pipeline from Hartley to Enbridge's Cheecham terminal and additional tankage at Cheecham.

The estimated cost of the project is about $475 million with an initial capacity of 90,000 barrels per day, expandable to 270,000 barrels per day. The facilities are expected to be in service in the latter half of 2013.

■■■ Heavy oil know-how is expected to flow in and out of Calgary with the establishment of the GE Global Heavy Oil Centre of Excellence.

The Alberta government and General Electric Canada have signed an agreement that will see the global innovation giant establish two new technology centres in Calgary and collaborate with the province in areas of shared expertise.

The heavy oil centre will provide and leverage engineering resources to develop solutions to the challenges of producing and upgrading heavy oil. It will be located within the GE Innovation Centre, which will showcase GE's innovation and technology capabilities and enable collaboration on solutions to the energy, water and infrastructure challenges facing Alberta and the world.

■■■ Connacher Oil and Gas says the 13.1-megawatt cogeneration facility at its newly commissioned Algar SAGD plant in the Great Divide region of northeastern Alberta has been completed on time and on budget.

The plant, which is capable of generating 3,700 barrels per day of steam at full design rate, was commissioned in late August and was integrated with the Algar plant in early September following a short plant outage to facilitate the electrical work. Algar is now islanded from the regional electrical grid.

■■■ Athabasca Oil Sands Corporation (AOSC) and Excelsior Energy have announced that they have entered into an agreement whereby AOSC will acquire all of the issued and outstanding common shares of Excelsior by way of plan of arrangement valued at approximately $144 million.

"The addition of Excelsior's high-quality assets to those of AOSC at Hangingstone is in line with the strategy we have presented to our investors and creates a world-class, standalone project," says Sveinung Svarte, president and chief executive officer of AOSC. "The transaction will result in a project of critical size and an accelerated development of the area. It also gives us ownership of their proprietary COGD [combustion overhead gravity drainage] technology."

■■■ Royal Dutch Shell, as operator of the Athabasca Oil Sands Project (AOSP), has announced the successful start of production of its 100,000-barrel-per-day Jackpine expansion.

The new Jackpine mine will combine with existing production from the Muskeg River mine to feed the Scotford upgrader, where an expansion is currently underway and scheduled to come on stream in 2011. The AOSP expansion is one of a sequence of major projects that the company says should raise Shell's global oil and gas production by 11 per cent.

■■■ The Regional Municipality of Wood Buffalo and Total E&P Canada have reached a memorandum of understanding regarding shared commitments to mitigate the socio-economic impacts should Total's Joslyn mining project be approved.

Under the memorandum, which the two groups hope will be adopted as part of the approval, the municipality says it is prepared to support the project, which it had previously committed to stand against during regulatory hearings.

■■■ Devon Energy's board of directors has sanctioned the company's third SAGD project on its Jackfish leases in the Athabasca oil sands.

Pending approval of the regulatory application filed last month, Devon expects to begin facilities construction at Jackfish 3 near the end of next year with plant start-up targeted for 2015.

Once fully operational, Jackfish 3 is expected to produce an average of 35,000 barrels of oil per day before royalties. Similar to Jackfish 1 and 2, the third phase represents an estimated 300 million barrels of recoverable oil before royalties.

Devon expects to spend US$1.2 billion on the project through start-up.

■■■ Cenovus Energy has received the regulatory go-ahead to build Phases F, G and H of its Foster Creek SAGD project, expected to boost gross production to 210,000 barrels per day from the current 120,000 barrels per day.

Engineering on Phase F is already underway and preliminary groundwork is expected to start soon. First production from this phase is anticipated in 2014. Production from the other two phases is anticipated in 2016–17. ■

Project listings

Updated status of oil sands projects in Alberta

As of December 10, 2010.

TECHNOLOGY LEGEND

COGD	Combustion overhead gravity drainage
CSS	Cyclic steam stimulation
ET-DSP	Electro-thermal dynamic stripping process
N-SOLV	Heated solvent vapour extraction
SAGD	Steam assisted gravity drainage
THAI	Toe to heel air injection

COMPANY	CURRENT PROJECT	CAPACITY (bbl/d)	START-UP	REGULATORY STATUS	DEVELOPMENT PROGRESS	TECHNOLOGY
ATHABASCA REGION – IN SITU						
ALBERTA OILSANDS						
Clearwater West	Pilot	4,500	2011	Application	Alberta Oilsands has appointed Andrew Constantinidis as vice-president of finance and business development. Most recently he was president and CFO of Eurogas. The company says his experience in large-project financing will help it accelerate development plans.	SAGD
	Commercial Project	15,000	2012	Announced		SAGD
ATHABASCA OIL SANDS						
MacKay	Phase 1	35,000	2014	Application	AOSC has completed its acquisition of Excelsior Energy. As of late October, the company said it would submit its Dover application by year-end 2010.	SAGD
	Phase 2	40,000	2017	Application		SAGD
	Phase 3	40,000	2019	Application		SAGD
	Phase 4	35,000	2012	Application		SAGD
Dover	Phase 1	35,000–50,000	2015	Announced		SAGD
Hangingstone	Pilot	1,000	2011	Application		COGD
BLACKPEARL RESOURCES						
Blackrod	Pilot	500	2011	Approved	Regulatory approvals received Oct. 2010. BlackPearl plans on drilling the SAGD well pair before the end of 2010, as well as commencing construction of oil handling facilities and installation of steam-generation equipment. First steam is expected in Q1/2011, with results to follow late in the year.	SAGD
CANADIAN NATURAL RESOURCES						
Birch Mountain Phase 1	Phase 1	60,000	2018	Announced		TBA
Birch Mountain Phase 2	Phase 2	60,000	2021	Announced		TBA
Gregoire Lake 1	Phase 1	60,000	2023	Announced		TBA
Grouse	Phase 1	60,000	2016	Announced		SAGD
Kirby	Phase 1	45,000	2013	Under Construction	During Q3/2010, Canadian Natural received approvals for Kirby and sanctioned it.	SAGD
Kirby (legacy Enerplus)	Phase 1	10,000	TBD	Application	Enerplus has sold its Kirby assets to Canadian Natural for $405 million.	SAGD
CENOVUS ENERGY						
Telephone Lake	Phase A	35,000	TBD	Application	Additional information is being collected to support regulatory application.	SAGD
	Phase B	15,000	TBD	Announced		SAGD
Christina Lake	Phase A & B	18,000	2002	Operating	Approvals for E, F and G are expected in 2011, and a wedge-well pilot has been launched at Christina Lake. Application for Phase H to be filed in 2015.	SAGD
	Phase C	40,000	2011	Construction		SAGD
	Phase D	40,000	2013	Approved		SAGD
	Phase E	40,000	2014	Application		SAGD
	Phase F	40,000	2016	Application		SAGD
	Phase G	40,000	2017	Application		SAGD
	Phase H	40,000	2019	Announced		SAGD
Narrows Lake	Phase A–C	130,000	2016	Announced	Application to be submitted in Q3.	SAGD
Foster Creek	Phase A–E	120,000	2001	Application	Cenovus has received regulatory approval to proceed with Foster Creek phases F-H. Engineering on Phase F is already underway, with preliminary ground work expected to commence in the near term.	SAGD
	Phase F	30,000	2014	Approved		SAGD
	Phase G	30,000	2016	Approved		SAGD
	Phase H	30,000	2017	Approved		SAGD
	Phase I	25,000	2019	Announced		SAGD
Grand Rapids	Phase A	60,000	2017	Announced	Single well pair SAGD pilot drilling complete, awaiting Alberta Environment's final approval.	SAGD
	Phase B	60,000	TBD	Announced		SAGD
	Phase C	60,000	TBD	Announced		SAGD
CONNACHER OIL AND GAS						
Great Divide	Pod 1	10,000	2007	Operating	15 out of 17 Algar well pairs are now on full SAGD. Connacher says that since completing construction of its cogen at Great Divide, those operations are more reliable. It has also submitted application for a SAGD/solvent injection test at Algar.	SAGD
	Pod 2 (Algar)	10,000	2010	Operating		SAGD
	Expansion	24,000	2013	Disclosed		SAGD

COMPANY	CURRENT PROJECT	CAPACITY (bbl/d)	START	REGULATORY STATUS	DEVELOPMENT PROGRESS	TECHNOLOGY
CONOCOPHILLIPS CANADA						
Surmont	Phase 1	27,000	2007	Operating	ConocoPhillips says that increased production from Canadian SAGD projects helped offset an overall production decrease in its global exploration and production segment in Q3.	SAGD
	Phase 2	83,000	2015	Under construction		SAGD
	Pilot	1,200	1997	Operating		SAGD
DEVON CANADA						
Jackfish	Phase 1	35,000	2007	Operating	Jackfish 1 was taken offline for three weeks during Q3 for scheduled maintenance but has now been reactivated.	SAGD
	Phase 2	35,000	2011	Under construction	Construction on Jackfish 2 is over 90 per cent complete. Devon plans to start steam injection in Q2/2011.	SAGD
	Phase 3	35,000	TBD	Announced	Jackfish 3 regulatory application to be filed in Q3/2010. Corporate sanction already in hand.	SAGD
Kirby-Pike	Phase 1	TBD	2015	Announced	Delineation drilling expected to begin in the second half of 2010.	SAGD
E-T ENERGY						
Poplar Creek	Pilot	1,000	2007	Operating	E-T Energy has received funding from Alberta's Climate Change and Emissions Management Corporation to further testing.	
		10,000	2012	Application		ET-DSP
GRIZZLY OIL SANDS						
Algar Lake	Phase 1	5,000	2013	Application	Grizzly has awarded SNC-Lavalin engineering and procurement for the first phase of the project.	SAGD
	Phase 2	5,000	2013	Application		SAGD
HARVEST ENERGY TRUST						
BlackGold	Phase 1	10,000	2012	Under construction	Project ground breaking celebration held Oct. 19.	SAGD
	Phase 2	20,000	TBD	Application		SAGD
HUSKY ENERGY						
McMullen	Pilot	755	TBD	Approved	Thermal test approved during Q3/2010.	SAGD
Sunrise	Phase 1	60,000	2014	Under construction	Husky's board of directors has sanctioned the Sunrise project.	SAGD
	Phases 2–3	140,000	TBD	Approved		SAGD
IVANHOE ENERGY						
Tamarack	SAGD with HTL upgrading	20,000	2014	Application	Application filed November 2010, anticipated to take between 18 and 24 months to process.	SAGD
JAPAN CANADA OIL SANDS						
Hangingstone	Pilot	10,000	1999	Operating	JACOS anticipates expansion approval in Q3/2011	SAGD
	Phase 1	35,000	TBD	Application		SAGD
LARICINA ENERGY						
Germain	Commercial demonstration	5,000	2012	Approved	Laricina has closed four equity financings since July 2010, raising in total approximately $340 million, which it says will allow it to move forward with confidence on Germain commercial demonstration project. Saleski remains on track for the fourth quarter.	SAGD
	Phase 2	30,000	2014–2015	Announced		SAGD
Saleski	SC-SAGD pilot	1,800	2010	Under construction		SAGD
	Phase 1	10,700	2013	Announced		SAGD
MEG ENERGY						
Christina Lake	Phase 1	3,000	2008	Operating	MEG is now a public company trading on the TSX under the symbol MEG. Phase 2B to begin operations in 2013. MEG has added John Rogers (former VP of investor relations at Suncor) and Jamey Fitzgibbon (former CEO of Oilsands Quest) to executive team. MEG plans to file an applicaiton for Surmont in 2012.	SAGD
	Phase 2	22,000	2009	Operating		SAGD
	Phase 2B	35,000	2013	Under construction		SAGD
	Phase 3A	75,000	TBD	Application		SAGD
	Phase 3B	75,000	TBD	Application		SAGD
Surmont	Multiple phases	50,000–100,000	TBD	Announced		SAGD
NEXEN						
Long Lake	Phase 1	72,000	2007	Operating	Long Lake experienced operational difficulties in Q3, but has since exceeded peak production rates set in July 2010, recently reaching 31,700 barrels per day.	SAGD
	Phase 2	72,000	TBD	Announced		SAGD
	Phase 3	72,000	TBD	Announced		SAGD
	Phase 4	72,000	TBD	Announced		SAGD
Long Lake South (Kinosis)	Phase 1	40,000	TBD	Approved	Nexen plans to be sanction-ready for Kinosis Phase 1 in 2012.	SAGD
	Phase 2	40,000	TBD	Approved		SAGD
N-SOLV						
	Pilot plant	2,000	TBD	Announced		N-SOLV
PARAMOUNT RESOURCES						
Hoole	Commercial project	TBD	TBD	Announced		SAGD

COMPANY	CURRENT PROJECT	CAPACITY (bbl/d)	START-UP	REGULATORY STATUS	DEVELOPMENT PROGRESS	TECHNOLOGY
PETROBANK ENERGY AND RESOURCES						
Whitesands	Pilot	1,800	2006	Operating	Re-drilled wells taking longer than expected to establish full communication with the combustion zone. Production averaged between 100 bbl/d and 500 bbl/d during Q3, ranging from heavy oil to upgraded THAI oil.	THAI
	Expansion	1,800	TBD	Approved		THAI
May River	Phase 1	10,000	2012	Application	May River is currently in final detailed engineering, and orders have been placed for some long-lead equipment.	THAI
	Subsequent Phases	90,000	TBD	Disclosed		THAI
SHELL CANADA						
Grosmont venture	Carbonate pilot	TBD	TBD	Announced	The project, which wold incorporate electrical heaters, has been delayed.	
SOUTHERN PACIFIC RESOURCE						
STP-McKay		12,000	2012	Aproved	Approval granted Oct. 2010. Southern Pacific says it will now proceed with final financing and construction. Southern Pacific has acquired North Peace Energy.	SAGD
STATOIL CANADA						
Kai Kos Dehseh-Leismer	Demonstration	10,000	2010	Operating	First steam achieved Sept. 3, 2010. First production expected after 2-3 months. Bangkok, Thailand-based PTT Exploration and Production will become a 40 per cent owner of all stages of Kai Kos Dehseh, at a cost of $2.3 million.	SAGD
Leismer	Commercial	10,000	TBD	Application		SAGD
	Expansion	20,000	TBD	Application		SAGD
Corner		40,000	TBD	Application		SAGD
Thornbury		40,000	TBD	Application		SAGD
Corner	Expansion	40,000	TBD	Application		SAGD
Hangingstone		20,000	TBD	Application		SAGD
Thornbury	Expansion	20,000	TBD	Application		SAGD
Northwest Leismer		20,000	TBD	Application		SAGD
South Leismer		20,000	TBD	Application		SAGD
SUNCOR ENERGY						
Chard	Phase 1	40,000	TBD	Announced	Suncor will not be providing any further updates on next projects to move forward until late 2010.	SAGD
Firebag	Phase 1	33,000	2004	Operating	Suncor has received regulatory approval for stages 4 through 6 of its Firebag project. Firebag Phase 3 expected to be complete in the second quarter of 2011, followed by an an 18- to 24-month ramp-up. Construction of Phase 4 remains subject to Suncor board approval.	SAGD
	Phase 2	35,000	2006	Operating		SAGD
	Cogeneration and Expansion	25,000	2007	Operating		SAGD
	Phase 3	68,000	2011	Under construction		SAGD
	Phase 4	68,000	2012	Approved		SAGD
	Phase 5	68,000	TBD	Approved		SAGD
	Phase 6	68,000	TBD	Approved		SAGD
Lewis	Phase 1	40,000	TBD	Application		SAGD
	Phase 2	40,000	TBD	Application		SAGD
MacKay River	Phase 1	33,000	2002	Operating		SAGD
	Phase 2	40,000	TBD	Approved		SAGD
Meadow Creek	Phase 1	40,000	TBD	Approved		SAGD
	Phase 2	40,000	TBD	Approved		SAGD
SUNSHINE OILSANDS						
Harper pilot	Production mobility test	<1,000	TBD	Approved	Project is expected to commence construction in 2010.	SAGD
Legend Lake	Phase 1	10,000	TBD	Announced	Sunshine Oilsands has increased its lease holdings to 1,078,705 acres. This is an increase of 57,118 acres. The company now owns and controls 100 per cent of 1,078,705 acres of oilsands leases, representing over 4,310 sq. km. of land (1,685 sections).	SAGD
	Phase 2 (two stages)	40,000	TBD	Announced		SAGD
West Ells	Phase 1	10,000	2012	Application	Construction to begin in 2011.	SAGD
	Phase 2 (two stages)	40,000	2013	Announced		SAGD
	Phase 3	30,000	TBD	Announced		SAGD
Thickwood	Phase 1	10,000	TBD	Announced		SAGD
	Phase 2 (two stages)	40,000	TBD	Announced		SAGD
	Phase 3	25,000	TBD	Announced		SAGD
TOTAL E&P CANADA						
Joslyn	Phase 1	2,000	2004	Suspended	Total E&P Canada is in the process of determining the best way forward for the assets on its Joslyn in situ lease.	SAGD
	Phase 2	10,000	2006	Suspended		SAGD
	Phase 3A	15,000	TBD	Withdrawn		SAGD
	Phase 3B	15,000	TBD	Withdrawn		SAGD

COMPANY	CURRENT PROJECT	CAPACITY (bbl/d)	START UP	REGULATORY STATUS	DEVELOPMENT PROGRESS	TECHNOLOGY
VALUE CREATION GROUP						
Terre de Grace	Pilot	10,000	TBD	Application		SAGD
	Phase 1	40,000	TBD	Announced	BP will become majority partner and operator of the Terre de Grace project.	SAGD
	Phase 2	40,000	TBD	Announced		SAGD
TriStar	Pilot	1,000	TBD	Application	Value Creation says the project will deonstrate high-reservoir qualities and advantages of integrating SAGD with its upgrading technology.	SAGD
ATHABASCA REGION – MINING						
ATHABASCA OIL SANDS PROJECT						
Jackpine	Phase 1A	100,000	2010/ 2011	Operating	Mining operations at Jackpine have begun. Successful start-up announced Sept. 15, 2010.	Mining
	Phase 1B	100,000	TBD	Approved		Mining
	Phase 2	100,000	TBD	Application		Mining
Muskeg River	Existing Facilities	155,000	2002	Operating		Mining
	Expansion and Debottlenecking	115,000	TBD	Approved		Mining
Pierre River	Phase 1	100,000	TBD	Application		Mining
	Phase 2	100,000	TBD	Application		Mining
CANADIAN NATURAL RESOURCES						
Horizon	Phase 1	110,000	2009	Operating	Approaching stable rates near capacity. Maintenance underway.	Mining
	Tranche 2	6,000–15,000	TBD	Approved	Maintenance complete, production ramping back near stable state levels.	Mining
	Tranche 3	10,000–20,000	TBD	Approved	Tranches 3 and 4 continue to be re-profiled based on learnings from Phase 1.	Mining
	Tranche 4	approx. 105,000	TBD	Approved		Mining
IMPERIAL OIL						
Kearl	Phase 1	110,000	2012	Under construction	Imperial is reconfiguring the development plan to include a combination of debottlenecking and expansion to minimize facility requirements and reduce the plant footprint. Overall production profile and total resource remain relatively unchanged, although the first phase capital spending will be higher.	Mining
	Phase 2	100,000	TBD	Approved		Mining
	Phase 3	100,000	TBD	Approved		Mining
SUNCOR ENERGY						
Fort Hills	Phase 1	165,000	TBD	Approved	Capital plans and sequencing for Suncor's next growth stages are under evaluation with a further update expected in Q4-2010.	Mining
	Debottlenecking	25,000	TBD	Approved	Total E&P Canada has acquired UTS' 20 per cent stake in Fort Hills.	Mining
Suncor – original operations	Millennium	294,000	1967	Operating		Mining
	Steepbank Debottleneck Phase 3	4,000	2007	Operating	Suncor says its remaining 2010 capital growth spending will be directed towards completion of a naptha unit at Upgrader 2, which is expected to increase the value of its product mix. The project is expected to be complete by the end of the fourth quarter of 2011.	Mining
	Millennium Debottlenecking	23,000	2008	Operating		Mining
	North Steepbank Extension		2010	Operating		Mining
Voyageur South	Phase 1	120,000	TBD	Application		Mining
SYNCRUDE (MILDRED LAKE AND AURORA)						
Syncrude – original operations	Stages 1 and 2	290,700	1978	Operating	Majority owner Canadian Oil Sands says that the nearest term-value opportunity for Syncrude rests in improving the reliability of operations rather than expansions.	Mining
	Stage 3 Expansion	116,300	2006	Operating		Mining
	Stage 3 Debottleneck	46,500	TBD	Announced		Mining
	Stage 4 Expansion	139,500	TBD	Announced		Mining
TOTAL E&P CANADA						
Joslyn	Phase 1 (North)	50,000	TBD	Application	Regulatory hearing underway, paused briefly but resumed after challenges dropped by local First Nations. Total and the Regional Municipality of Wood Buffalo have also entered into an agreement to address community infrastructure challenges should the project be approved.	Mining
	Phase 2 (North)	50,000	TBD	Application		Mining
	Phase 3 (South)	50,000	TBD	Announced		Mining
	Phase 4 (South)	50,000	TBD	Announced		Mining
Northern Lights	Phase 1	57,250	TBD	Withdrawn	Northern Lights asset is being integrated into Total portfolio. Will reinstate after new timing is determined.	Mining
	Phase 2	57,250	TBD	Withdrawn		Mining
SILVERBIRCH ENERGY						
Frontier	Phase 1	100,000	TBD	Disclosed	SilverBirch Energy expects to be in a position to file its application for the integrated Frontier/Equinox project (where Equinox is a satellite to Frontier) in early 2011. Approval expected in 2014 followed by full-scale development. SilverBirch Energy is the new company created after UTS spun out its Fort Hills mine stake to Total E&P Canada.	Mining
	Phase 2	60,000	TBD	Disclosed		Mining
	Equinox Satellite	50,000	TBD	Disclosed		Mining
COLD LAKE REGION – IN SITU						
CANADIAN NATURAL RESOURCES						
Primrose/Wolf Lake	Wolf Lake	13,000	1985	Operating	Canadian Natural's Primrose production increased by approximately 30,000 barrels per day in Q3/2010 versus Q3/2009, up to 85,000 barrels per day. The company has received regulatory approval to commence steaming of the next cycle at Primrose East, which was suspended in Q1/2010 due to operational issues.	CSS
	Wolf Lake SAGD	5,500	TBD	Application		SAGD
	Primrose South	45,000	1985	Operating		CSS
	Primrose North	30,000	2006	Operating		CSS
	Primrose East (Burnt Lake)	32,000	2009	Operating		CSS
	CSS Follow-up Process	25,000	2018	Application		CSS

COMPANY	CURRENT PROJECT	CAPACITY (bbl/d)	START-UP	REGULATORY STATUS	DEVELOPMENT PROGRESS	TECHNOLOGY
HUSKY ENERGY						
Caribou	Demonstration Project	10,000	TBD	Approved		SAGD
Tucker	Phase 1	30,000	2006	Operating	Husky says that during Q3, three newly designed well pairs commenced production at Tucker.	SAGD
IMPERIAL OIL						
Cold Lake	Phases 1–10: Leming, Maskwa, Mahihkan	110,000	1985	Operating	Imperial says the regulatory approval process advanced with the recent ERCB Cold Lake scheme amendment and Alberta Utilities Commission approvals. Current activities include plant site clearing, grading and road construction.	CSS
	Phases 11–13: Mahkeses	30,000	2003	Operating		CSS
	Phases 14–16: Nabiye, Mahihkan North	30,000	TBD	Approved		CSS
KOCH EXPLORATION CANADA						
Gemini	Pilot	1,200	TBD	Application	According to the Cold Lake Sun, the project is nearing the end of the regulatory application process, with a planned first phase single well pair SAGD test.	SAGD
	SAGD Project	10,000	TBD	Application		SAGD
OSUM OIL SANDS						
Taiga	SAGD/CSS Project	25,000–35,000	2014	Application	Osum has closed a $100-million private placement to a wholly owned subsidiary of Korea Investment Corporation, which Osum says will be directed in its in situ projects and general corporate purchases.	SAGD
PENGROWTH ENERGY TRUST						
Lindbergh	SAGD Pilot	2,500	2012	Application	Pengrowth says that Lindbergh is one of four major operated growth areas that will enjoy parts of its $400-million 2011 projected capital program.	SAGD
SHELL CANADA						
Orion	Phase 1	10,000	2008	Operating	Orion production averaged 2,898 barrels per day in the second quarter.	SAGD
	Phase 2	10,000	TBD	Approved		SAGD
PEACE RIVER REGION – IN SITU						
ANDORA ENERGY (PAN ORIENT)						
Sawn Lake	SAGD Demonstration	1,400	TBD	Approved	Andora owner Pan Orient Energy says the Sawn Lake pilot will cost approximately $15 million.	SAGD
PETROBANK ENERGY AND RESOURCES						
Dawson	THAI Pilot	TBD	2011	Approved	Petrobank received regulatory approval for a two-well THAI pilot at Dawson in November 2010. It anticipates project start-up in the third quarter of 2011.	THAI
SHELL CANADA						
Carmon Creek	Cadotte Lake	12,501	1986	Operating	New application filed January 2010. Shell expects construction of first 40,000-barrel-per-day plant to commence in 2011, with a second 40,000-barrel facility three years following.	CSS
	Phases 1 and 2	80,000	TBD	Application		CSS
SOUTHERN PACIFIC RESOURCE CORP.						
Red Earth	CSS Pilot	1,000	2008	Operating	Southern Pacific and North Peace Energy have completed the plan of arrangement by which Southern Pacific acquires all issued securities of North Peace and its assets.	CSS
	Expansion	3,000	TBD	Announced		CSS
	Commercial Project	10,000	TBD	Announced		CSS
NORTHWEST SASKATCHEWAN – IN SITU						
OILSANDS QUEST						
Axe Lake	Reservoir Test	600	2008	Operating	Oilsands Quest has announced it is pursuing strategic alternatives in order to secure funds to progress its operations. Oilsands Quest is re-abandoning core holes in the region that were not abandoned to the required standard for in situ oilsands operations. The company successfully re-abandoned 14 core holes as of Oct. 5, 2010, and planned to abandon a further five to year-end.	Test
	SAGD Test	TBD	TBD	Application		SAGD
	Commercial SAGD	30,000	TBD	Application		SAGD

COMPANY	CURRENT PROJECT	CAPACITY - BITUMEN (bbl/d)	CAPACITY - PRODUCTS (bbl/d)	START-UP	REGULATORY STATUS	DEVELOPMENT PROGRESS	TECHNOLOGY
ATHABASCA REGION – UPGRADING							
CANADIAN NATURAL RESOURCES							
Horizon	Phase 1	135,000	114,000	2008	Operating	Maintenance complete, production ramping back near stable state levels.	Upgrader
	Tranches 2 & 3	135,000	118,000	TBD	Approved	Canadian Natural hopes to sanction Tranche 2 by the end of 2010. Tranches 3 and 4 continue to be re-profiled based on learnings from Phase 1.	Upgrader
	Tranche 4	145,000	125,000	TBD	Announced		Upgrader

NEXEN							
Long Lake	Phase 1	72,000	58,500	2008	Operating	Long Lake experienced operational difficulties in Q3, but has since exceeded peak production rates set in July 2010, recently reaching 31,700 barrels per day. During the third quarter Long Lake sold premium synthetic heavy when unable to sell premium sweet crude.	Upgrader
	Phase 2	72,000	58,500	TBD	Approved		Upgrader
	Phase 3	72,000	58,500	TBD	Announced		Upgrader
	Phase 4	72,000	58,500	TBD	Announced		Upgrader
	Phase 5	72,000	58,500	TBD	Announced		Upgrader
	Phase 6	72,000	58,500	TBD	Announced		Upgrader
SUNCOR ENERGY							
Suncor—original operations	Base U1 and U2	281,000	225,000	1967	Operating	Suncor says its remaining 2010 capital growth spending will be directed towards completion of a naptha unit at Upgrader 2, which is expected to increase the value of its product mix. The project is expected to be complete by the end of the fourth quarter of 2011.	Upgrader
	Millennium Vacuum Unit	43,000	35,000	2005	Operating		Upgrader
	Millennium Coker Unit	116,000	97,000	2008	Operating		Upgrader
Voyageur	Phase 1	156,000	127,000	TBD	Suspended	Capital plans and sequencing for the next stages of Suncor's growth to be announced in Q4-2010.	Upgrader
	Phase 2	78,000	63,000	TBD	Approved		Upgrader
SYNCRUDE							
Mildred Lake	Stages 1 and 2	290,700	250,000	1978	Operating	Majority owner Canadian Oil Sands says that the nearest term-value opportunity for Syncrude rests in improving the reliability of operations rather than expansions.	Upgrader
	Stage 3 Expansion	116,300	100,000	2006	Operating		Upgrader
	Stage 3 Debottleneck	46,500	40,000	TBD	Announced		Upgrader
	Stage 4 Expansion	139,500	120,000	TBD	Announced		Upgrader
VALUE CREATION							
Terre de Grace Upgrader	Phase 1	2,000	N/Q	TBD	Application	BP will become majority partner in Terre de Grace project for $900 million.	Upgrader
	Phase 2	10,000	N/Q	TBD	Application		Upgrader
TriStar	Pilot	1,000	N/Q	TBD	Application	Value Creation says the project will deonstrate high-reservoir qualities and advantages of integrating SAGD with its upgrading technology.	Upgrader
INDUSTRIAL HEARTLAND REGION — UPGRADING							
BA ENERGY							
Heartland Upgrader	Phase 1	54,400	46,300	TBD	Approved	Construction suspended.	Upgrader
	Phase 2	54,400	46,300	TBD	Approved		Upgrader
	Phase 3	54,400	46,300	TBD	Approved		Upgrader
NORTH WEST UPGRADING							
Upgrader	Phase 1	50,000	46,400	2013	Approved	In November 2010, North West said it anticipated negotiations with the Alberta government under its bitumen royalty-in-kind program to be complete by year-end.	Upgrader
	Phase 2	50,000	46,400	TBD	Approved		Upgrader
	Phase 3	50,000	46,400	TBD	Approved		Upgrader
SHELL CANADA							
Scotford Upgrader 1		155,000	158,000	2003	Operating	Mining feed for upgrader expansion now in operations. Updgrader expansion to come onstream in 2011.	Upgrader
	Expansion	90,000	91,000	2010	Under construction		Upgrader
Scotford Upgrader 2	Phase 1	100,000	97,750	TBD	Withdrawn	Shell has withdrawn the application for Scotford Upgrader 2.	Upgrader
	Phase 2	100,000	97,750	TBD	Withdrawn		Upgrader
	Phase 3	100,000	97,750	TBD	Withdrawn		Upgrader
	Phase 4	100,000	97,750	TBD	Withdrawn		Upgrader
SUNCOR ENERGY							
Fort Hills Upgrader	Phase 1	165,000	145,000	TBD	Approved	Capital plans and sequencing for the next stages of Suncor's growth to be announced in Q4-2010.	Upgrader
	Phases 2 and 3	175,000	145,000	TBD	Approved		Upgrader
STATOIL CANADA							
Upgrader	Phase 1	75,000	65,000	TBD	Withdrawn	Application on hold indefinitely.	Upgrader
	Phase 2	175,000	152,000	TBD	Withdrawn		Upgrader
TOTAL E&P CANADA							
Northern Lights Upgrader	Phase 1	56,600	50,600	TBD	Withdrawn	The ERCB has approved the Total upgrader, under seven conditions. Total says it must study the decision report in order to consider its next steps.	Upgrader
	Phase 2	56,600	50,600	TBD	Withdrawn		Upgrader
Total Upgrader	Phase 1	150,000	138,000	TBD	Approved		Upgrader
	Phase 2	95,000	87,000	TBD	Approved		Upgrader
	Debottlenecking	50,000	46,000	TBD	Approved		Upgrader

Glossary of oil sands terms

API
An American Petroleum Institute measure of liquid gravity. Water is 10 degrees API, and a typical light crude is from 35 to 40. Bitumen is 7.5 to 8.5.

Barrel
The traditional measurement for crude oil volumes. One barrel equals 42 US gallons (159 litres). There are 6.29 barrels in one cubic metre of oil.

Bitumen
Naturally occurring, viscous mixture of hydrocarbons that contains high levels of sulphur and nitrogen compounds. In its natural state, it is not recoverable at a commercial rate through a well because it is too thick to flow. Bitumen typically makes up about 10 per cent by weight of oilsand, but saturation varies.

Condensate
Mixture of extremely light hydrocarbons recoverable from gas reservoirs. Condensate is also referred to as a natural gas liquid, and is used as a diluent to reduce bitumen viscosity for pipeline transportation.

Cyclic steam stimulation
For several weeks, high-pressure steam is injected into the formation to soften the oilsand before being pumped to the surface for separation. The pressure created in the underground environment causes formation cracks that help move the bitumen to producing wells. After a portion of the reservoir has been saturated, the steam is turned off and the reservoir is allowed to soak for several weeks. Then the production phase brings the bitumen to the surface.

Density
The heaviness of crude oil, indicating the proportion of large, carbon-rich molecules, generally measured in kilograms per cubic metre (kg/m^3) or degrees on the American Petroleum Institute (API) gravity scale; in western Canada, oil up to 900 kg/m^3 is considered light to medium crude — oil above this density is deemed as heavy oil or bitumen.

Diluent
see *Condensate*

Established recoverable reserves
Reserves recoverable under current technology and present and anticipated economic conditions, plus that portion of recoverable reserves that is interpreted to exist, based on geological, geophysical, or similar information, with reasonable certainty.

Established reserves
Reserves recoverable with current technology and present and anticipated economic conditions specifically proved by drilling, testing, or production, plus the portion of contiguous recoverable reserves that are interpreted to exist from geological, geophysical, or similar information with reasonable certainty.

Extraction
A process, unique to the oil sands industry, which separates the bitumen from the oilsand using hot water, steam, and caustic soda.

Froth treatment
The means to recover bitumen from the mixture of water, bitumen, and solids "froth" produced in hot water extraction (in mining-based recovery).

Gasification
A process to partially oxidize any hydrocarbon, typically heavy residues, to a mixture of hydrogen and carbon monoxide. Can be used to produce hydrogen and various energy byproducts.

Greenhouse gases
Gases commonly believed to be connected to climate change and global warming. CO_2 is the most common, but greenhouse gases also include other light hydrocarbons (such as methane) and nitrous oxide.

Initial established reserves
Established reserves prior to the deduction of any production.

Initial volume in place
The volume calculated or interpreted to exist in a reservoir before any volume has been produced.

In situ
Latin for "in place." In situ recovery refers to various methods used to recover deeply buried bitumen deposits.

In situ combustion
A displacement enhanced oil recovery method. It works by generating combustion gases (primarily CO and CO_2) downhole, which then "pushes" the oil towards the recovery well.

Lease
A legal document from the province of Alberta giving an operator the right to extract bitumen from the oilsand existing within the specified lease area. The land must be reclaimed and returned to the Crown at the end of operations.

Muskeg
A water-soaked layer of decaying plant material, one to three metres thick, found on top of the overburden.

Oil Sands
Bitumen-soaked sand, located in four geographic regions of Alberta: Athabasca, Wabasca, Cold Lake, and Peace River. The Athabasca deposit is the largest, encompassing more than 42,340 square kilometres. Total deposits of bitumen in Alberta are estimated at 1.7 trillion to 2.5 trillion barrels.

Overburden
A layer of sand, gravel, and shale between the surface and the underlying oilsand. Must be removed before oil sands can be mined. Overburden underlies muskeg in many places.

Pilot plant
Small model plant for testing processes under actual production conditions.

Proven recoverable reserves
Reserves that have been proven through production or testing to be recoverable with existing technology and under present economic conditions.

Reclamation
Returning disturbed land to a stable, biologically productive state. Reclaimed property is returned to the province of Alberta at the end of operations.

Remaining established reserves
Initial reserves less cumulative production.

Royalty
The Crown's share of production or revenue. About three quarters of Canadian crude oil is produced from lands, including the oil sands, on which the Crown holds mineral rights. The lease or permit between the developer and the Crown sets out the arrangements for sharing the risks and rewards.

Steam assisted gravity drainage (SAGD)
An in situ production process using two closely spaced horizontal wells: one for steam injection and the other for production of the bitumen/water emulsion.

Synthetic crude oil
A manufactured crude oil comprised of naphtha, distillate, and gas oil-boiling range material. Can range from high-quality, light sweet bottomless crude to heavy, sour blends.

Tailings
A combination of water, sand, silt, and fine clay particles that is a byproduct of removing the bitumen from the oilsand.

Tailings settling basin
The primary purpose of the tailings settling basin is to serve as a process vessel allowing time for tailings water to clarify and silt and clay particles to settle, so the water can be reused in extraction. The settling basin also acts as a thickener, preparing mature fine tails for final reclamation.

Thermal recovery
Any process by which heat energy is used to reduce the viscosity of bitumen in situ to facilitate recovery.

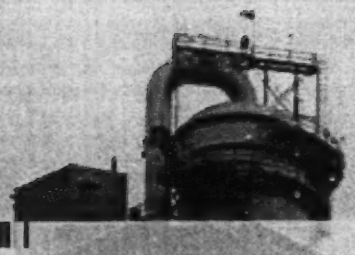
Toe to heel air injection (THAI)
An in situ combustion method for producing heavy oil and oilsand. In this technique, combustion starts from a vertical well, while the oil is produced from a horizontal well having its toe in close proximity to the vertical air-injection well. This production method is a modification of conventional fire flooding techniques in which the flame front from a vertical well pushes the oil to be produced from another vertical well.

Truck-and-shovel mining
Large electric or hydraulic shovels are used to remove the oilsand and load very large trucks. The trucks haul the oilsand to dump pockets where it is conveyed or pipelined to the extraction plant. Trucks and shovels are more economic to operate than the bucket-wheel reclaimers and draglines they have replaced at oil sands mines.

Upgrading
The process of converting heavy oil or bitumen into synthetic crude either through the removal of carbon (coking) or the addition of hydrogen (hydroconversion).

Vapour extraction (VAPEX)
VAPEX is a non-thermal recovery method that involves injecting a gaseous hydrocarbon solvent into the reservoir where it dissolves into the sludge-like oil, which becomes less viscous (or more fluid) before draining into a lower horizontal well and being extracted.

Viscosity
The ability of a liquid to flow. The lower the viscosity, the more easily the liquid will flow.



CONTACTS

Oil Sands Producers

• Alberta Oilsands	www.aboilsands.ca
• Albian Sands Energy	www.albiansands.ca
• Andora Energy	www.andoraenergy.com
• Athabasca Oil Sands	www.aosc.com
• Baytex Energy	www.baytex.ab.ca
• Canadian Natural Resources	www.cnrl.com
• Cenovus Energy	www.cenovus.com
• Chevron Canada	www.chevron.ca
• Connacher Oil and Gas	www.connacheroil.com
• ConocoPhillips Canada	www.conocophillips.ca
• Devon Canada	www.dvn.com
• Enerplus Resources Fund	www.enerplus.com
• E-T Energy	www.e-tenergy.com
• Excelsior Energy	www.excelsiorenergy.com
• Husky Energy	www.huskyenergy.ca
• Imperial Oil	www.imperialoil.ca
• Ivanhoe Energy	www.ivanhoe-energy.com
• Japan Canada Oil Sands	www.jacos.com
• Korea National Oil Corporation	www.knoc.co.kr
• Laricina Energy	www.laricinaenergy.com
• Marathon Oil	www.marathon.com
• MEG Energy	www.megenergy.com
• Nexen	www.nexeninc.com
• North Peace Energy	www.northpec.com
• North West Upgrading	www.northwestupgrading.com
• N-Solv	www.n-solv.com
• Occidental Petroleum Corporation	www.oxy.com
• Oilsands Quest	www.oilsandsquest.com
• Opti Canada	www.opticanada.com
• OSUM Oil Sands	www.osumcorp.com
• Pan Orient Energy	www.panorient.ca
• Patch International	www.patchenergy.com
• Pengrowth Energy Trust	www.pengrowth.com
• Petro-Canada	www.petro-canada.com
• Petrobank Energy and Resources	www.petrobank.com
• Shell Canada	www.shell.ca
• Southern Pacific Resource	www.shpacific.com
• Statoil Canada	www.statoil.com
• Suncor Energy	www.suncor.com
• Sunshine Oilsands	www.sunshineoilsands.com
• Syncrude	www.syncrude.ca
• Talisman Energy	www.talisman-energy.com
• Teck Cominco	www.teckcominco.com
• Total E&P Canada	www.total-ep-canada.com
• UTS Energy	www.uts.ca
• Value Creation Group	www.vctek.com

Associations/Organizations

• Alberta Building Trades Council	www.albertabuildingtrades.com
• Alberta Chamber of Resources	www.acr-alberta.com
• Alberta Chambers of Commerce	www.abchamber.ca
• Alberta Energy	www.energy.gov.ab.ca
• Alberta Energy Research Institute	www.aeri.ab.ca
• Alberta Environment	www.environment.alberta.ca
• Alberta Finance and Enterprise	www.finance.gov.ab.ca
• Alberta Research Council	www.arc.ab.ca
• Alberta's Industrial Heartland Association	www.industrialheartland.com
• Canadian Association of Geophysical Contractors	www.cagc.ca
• Canadian Association of Petroleum Producers	www.capp.ca
• Canadian Heavy Oil Association	www.choa.ab.ca
• Canadian Oil Sands Network for Research and Development	www.conrad.ab.ca
• Energy Resources Conservation Board	www.ercb.ca
• In Situ Oil Sands Alliance	www.iosa.ca
• Lakeland Industry and Community Association	www.lica.ca
• Natural Resources Conservation Board	www.nrcb.gov.ab.ca
• Oil Sands Developers Group	www.oilsandsdevelopers.ca
• Oil Sands Leadership Initiative	www.osli.ca
• Petroleum Technology Alliance Canada	www.ptac.org

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